



Transport
Roads & Maritime
Services

GREAT WESTERN HIGHWAY UPGRADE AT KELSO

Submissions report

MAY 2012

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Roads and Maritime Services

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Submissions report
May 2012

Prepared by nghenvironmental



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I Executive summary

Roads and Maritime Services (RMS) proposes to widen around 2.4 kilometres of the Great Western Highway at Kelso to four lanes with a divided carriageway separated by a central median. The proposed upgrade extends from just west of the Great Western Highway intersection with Stockland Drive to just east of Ashworth Drive (the proposal).

A review of environmental factors (REF) was prepared to assess the environmental impacts of the proposal. The REF was displayed between 27 February and 27 March 2012 at three locations in Bathurst and made available for download on the RMS website. Community updates were distributed in the adjacent areas and advertisements were placed in local papers to promote the display of the REF. Two information sessions were held in Bathurst and Kelso.

This submissions report relates to the REF prepared for the Great Western Highway upgrade in Kelso, and should be read in conjunction with the REF. A total of 13 submissions from the community were received in response to the display of the REF. The issues raised in the submissions were analysed, grouped and a response provided as part of this submissions report.

The main issues raised were in relation to:

- Source of funding for the proposal.
- Proposed intersection treatment options.
- Type of landscaping.
- Noise and vibration impacts during operation.
- Property acquisitions.
- Scope of consultation process.
- Road safety.

Responses to these issues have been prepared as part of this report. Some issues outside the scope of the proposal were also received and have been addressed.

Some additional measures for the management of impacts during construction and operation have also been developed. These measures have been incorporated into the revised environmental management measures for the proposal.

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1 Introduction and background

1.1 Purpose

This submissions report relates to the review of environmental factors (REF) prepared for the Great Western Highway upgrade at Kelso, and should be read in conjunction with that document.

The REF was placed on public display and submissions relating to the proposal and the REF were received by Roads and Maritime Services (RMS). This submissions report summarises the issues raised and provides responses to each issue (Chapter 2), discusses issues raised that were considered outside the scope of the proposal (Chapter 3) and identifies new or revised environmental management measures (Chapter 4).

1.2 The proposal

The proposal is for the widening of about 2.4 kilometres of the Great Western Highway at Kelso to four lanes with a divided carriageway separated by a central median. The proposed upgrade extends from just west of the Great Western Highway intersection with Stockland Drive to just east of Ashworth Drive (the proposal).

The proposal is in Bathurst Regional Council local government area (LGA) and within RMS Western region. Kelso is situated about four kilometres east of the Bathurst central business district (CBD).

The proposal is required to ease current traffic congestion at peak times and to cater for future traffic growth from increased population and residential and commercial development anticipated in the area.

The key features of the proposal include:

- A dual carriageway with two lanes, 3.5 metres wide in each direction (four lanes in total).
- A central median of variable width and barrier type for the entire length.
- Three metre wide shoulders.
- A retained 60 km/h speed limit.
- Shared pedestrian and cycle paths 2.5 metres wide on the southern side of the highway between Stockland Drive and Boyd Street and on the northern side of the highway between Boyd Street and Ashworth Drive. A 1.5 metre wide footpath would be provided on both sides of the road where there would be no shared cycleway.
- Four intersections with traffic signals at Stockland Drive, Gilmour Street, Boyd Street and Pat O'Leary Drive.
- Two intersections with roundabouts at Littlebourne Street and Ashworth Drive.
- Two unsignalised intersections at View Street and Lee Street.
- Realignment of Boyd Street intersection about 20 metres to the east.
- Dedicated right turn bays from the highway to Stockland Drive, Gilmour Street, Boyd Street, View Street, and Pat O'Leary Drive.
- A u-turn facility in Stockland Drive.
- Demolition of the existing bridge and construction of a new single span bridge over Boyd Creek. The new bridge would be around 20 metres long and 33

metres wide. The bridge would include four lanes, each 3.5 metres in width, with two lanes carrying traffic in each direction, a footpath on the southern side and a shared pedestrian and cycle path on the northern side.

- Construction of two new culverts about 160 metres west of Ashworth Drive and below the southern extension of the proposed Ashworth Drive roundabout at the planned intermodal terminal site entrance.
- Expansion of an existing culvert at Littlebourne Street.
- Relocation of about 460 metres of Boyd Creek and an unnamed tributary at Ashworth Drive to around 30 metres south of its existing location. This would involve reclamation of an unnamed tributary and excavation work to create the new section of creek line. An option to pipe the section of creek and unnamed tributary underground instead of relocating it would also be further investigated during detailed design. This is to minimise land use impacts to the proposed intermodal terminal at the site.
- Adjustments to public utilities such as electricity power poles, water mains, sewer, gas, and telecommunication lines along the route.
- A main compound site located south of the highway west of Ashworth Drive in the area of the proposed intermodal terminal. Smaller stockpile and storage areas would be required along the length of the proposal.
- Temporary measures including sedimentation basins along the length of the proposal.

1.3 REF display

RMS prepared a review of environmental factors to assess the environmental impacts of the proposed works. The review of environmental factors was exhibited between 27 February 2012 and 27 March 2012 at three locations, as detailed in Table 1.1. Staffed displays were also undertaken at two locations, as detailed in Table 1.1. The review of environmental factors was placed on the RMS internet website and made available for download. The exhibition locations and website link were advertised in the Western Advocate (24 February 2012 and 1 March 2012) and the Oberon Review (23 February and 1 March 2012).

In addition to the above public exhibition, an invitation to comment with a link to the review of environmental factors was sent directly to around 350 people and organisations in the project database. Residents of Kelso were also advised via a householder letter which was letterbox dropped to 2,250 households.

Table 1.1: Display locations

Location	Address/Time
Displays	
Bathurst Regional Council foyer	Corner of William Street and Russell Street, Bathurst.
Bathurst Motor Registry	Corner of Mitchell Highway and Bradwardine Road, Bathurst.
Bathurst Library	70–78 Keppel Street, Bathurst.
Staffed displays	
Bathurst Library	70–78 Keppel Street, Bathurst. Tuesday 6 March 2012, 2.30pm – 5.30pm
Kelso Hotel	37 Sydney Road, Kelso. Wednesday 7 March 2012, 11am – 2pm

2 Response to issues

RMS received 13 submissions, accepted up until the 27 March 2012. Table 1.2 lists the respondents and each respondent's allocated submission number. The table also indicates where the issues from each submission have been addressed.

Table 1.2: Respondents

Respondent	Submission No.	Section number where issues are addressed
Individual	1	2.3
Individual	2	2.4.1, 2.4.2, 2.5.1
Individual	3	2.4.1,
Individual	4	2.3
Individual	5	2.5.1, 2.5.2
Individual	6	2.6.1
Individual	7	3.1
Individual	8	2.2, 2.7, 3.2
Individual	9	3.1
Individual	10	2.6.1
Individual	11	3.1, 3.3
Individual	12	2.2, 3.4
Individual	13	3.1

2.1 Overview of issues raised

A total of 13 submissions were received in response to the exhibition of the environmental assessment, comprising no submissions from government agencies and 13 from the community.

Each submission has been examined individually to understand the issues being raised. The issues raised in each submission have been extracted and collated, and corresponding responses to the issues have been provided. Where similar issues have been raised in different submissions, only one response has been provided. The issues raised and RMS' response to these issues forms the basis of this chapter.

Two submissions supported the proposal. Eleven submissions objected to specific components of the proposal.

The main issues raised included:

- Source of funding for the proposal.
- Proposed intersection treatment options.
- Type of landscaping.
- Noise and vibration impacts during operation.
- Property acquisitions.
- Scope of consultation process.
- Road safety.

A number of issues outside of the scope of the proposal were also raised by the public. These are discussed in Chapter 3.

2.2 Funding

Submission number(s)

8, 12

Issue description

- Details of the funding source for the proposal should be provided.
- Will there be funding left to undertake construction works considering the money spent on surveys, REF and other investigations.

Response

The Great Western Highway upgrade at Kelso was announced by the NSW Government in June 2010 as being funded for the planning phase only. RMS is currently developing this project using State funds. Funding for construction, whether State or federal, is yet to be determined.

2.3 Landscape character and visual amenity

Submission number(s)

1, 4

Issue description

- Use of deciduous trees should be considered for landscaping. This has the potential to reduce the risk of black ice. Appropriate species should be considered as part of the landscaping.
- Query on whether consultation with public would be undertaken to determine species to be used for landscaping.

Response

An urban design and visual assessment report was prepared for the proposal (Tract Consultants 2011). A complete copy of the report is available in Appendix J of the REF, and a summary of the findings is provided in Section 6.7 of the REF. The report provides a framework and general principles for the landscape design for the proposal. One of the urban design principles recommended is to integrate the streetscape of the proposed highway upgrade with the Bathurst Regional Council's vegetation management plan (Terra Consulting 2003). The vegetation management plan includes planting recommendations for the streetscape of Kelso, identified as the eastern gateway of Bathurst. Terra Consulting (2003) recommends the use of a combination of exotic and native species and deciduous and non-deciduous trees along the road corridor. The landscape design would be developed at the detailed design stage and would determine the planting mass required including consideration of maintenance requirements.

To date, traffic safety data has not indicated that black ice is an issue on this section of the highway. However, it is recognised that the use of deciduous trees in landscaping would cause less shading over the road and could minimise the occurrence of black ice. This issue would be considered when developing the landscape design during the detailed design stage.

The urban and landscape design concept plan in Tract Consultants (2011) was established with input from Bathurst Regional Council and representatives of community groups. The plan, including what species would be used for landscaping, would be further developed during detailed design in consultation with Bathurst Regional Council and representatives of community groups (such as Greening Australia and local heritage groups).

Chapter 4 provides all additional safeguards (from that outlined in the REF) which would be implemented to address landscaping issues.

2.4 Socio-economic impacts

2.4.1 Property impacts

Submission number(s)

2, 3

Issue description

- Will the value of land decrease as a result of partial acquisition?
- The design of the roundabout at Littlebourne Street and road alignment at this location should be modified (i.e. shifted to the north) to avoid property impacts (submission provided an alternative design showing how property impacts could be avoided). The concept design provided in the REF is not at an appropriate scale to allow adequate assessment of impacts to properties.
- Disagrees with acquired land being used for landscaping and considers it is not within the scope of road construction.

Response

RMS has developed the concept design to reduce impacts on properties where possible. The majority of the acquisitions would be partial strip acquisitions of land fronting the highway and while some impacts may occur to minimum lot sizes, set backs and floor space ratios, it is unlikely to impact on the operational viability of any specific land use. RMS would continue to minimise property impacts during detailed design.

Property valuations of acquired land are determined based on the value of the property unaffected by the proposal as outlined in the Land Acquisition Guide. Other matters that are considered when assessing compensation include:

- Special value.
- Severance.
- Disturbance.
- Hardship.
- Any increase or decrease in the value of adjoining or severed land (as affected by the proposal).

The value of any residual land would be as per current market conditions. RMS would consult further with the affected property owners to discuss property acquisition and timing. All property valuation and acquisition would be carried out in accordance with the RMS Land Acquisition Information Guide (RMS 2012) and the

Land Acquisition (Just Terms Compensation) Act 1991. Where property acquisition is required (i.e. impacts to the property cannot be avoided), RMS would contact the relevant landowners and initiate a consultation and negotiation process, before compulsory acquisition (if required).

The location of the proposed roundabout at Littlebourne Street as described in the REF took into account the intersection options assessment criteria as detailed in Section 2.4.1 of the REF. The location sought to achieve an adequate horizontal alignment and minimise impacts to utilities and property acquisitions.

Further investigations in April and May 2012 have been undertaken to determine the feasibility of reducing property impacts on the southern side of the highway at the Littlebourne Street intersection as a result of the proposed roundabout. These investigations took into account the alternative design provided by a community member. The various options to refine the preferred option have shown that property impacts can be reduced, though not completely avoided, compared to the proposed impacts outlined in Chapter 3 of the REF. Avoiding or minimising property impacts through shifting the alignment of the proposed roundabout to the north, has the potential to create additional impacts to utilities, line of sight and/or allowable speed limits.

Ongoing investigations would be undertaken during detailed design to minimise property impacts where possible and property owners would be consulted during the process (refer to Chapter 4 for amended safeguards which would be implemented (from that outlined in the REF). The selection of a refined option for this intersection would need to consider existing properties as well as other constraints such as utilities. Impacts to properties with a plan (at a suitable scale) showing indicative acquisitions were provided in section 3.6 of the REF. Detailed design would be undertaken at appropriate scales to visualise property impacts.

Land acquisition for the proposal has not been undertaken solely for the purpose of landscaping works. Land marked for acquisition is necessary to accommodate the extent of the proposal which includes the road widening works as well as the provision of shared pedestrian and cycle paths. Landscaping is applied to areas affected by the proposal, to assist in mitigating the effects of the proposal and integrate it into its context. Where required, landscaping occasionally extends beyond the proposal boundary to further mitigate impacts. This is undertaken through negotiation with adjoining land owners and local authorities. Landscaping plans were developed in consultation with the local council and representatives of community groups and would be applied to areas affected by the proposal. The plan is in accordance with the design principles and safeguards outlined in the urban design and visual assessment report prepared for the proposal (Tract Consultants 2011). A complete copy of the report is available in Appendix J of the REF, and a summary of the findings is provided in Section 6.7 of the REF.

2.4.2 Road safety

Submission number(s)

2

Issue description

- Road safety should be considered along Sydney Road and View Street due to speeding trucks.

Response

The speed limit through Kelso would remain unchanged at 60 km/h. Furthermore, the concept design for the proposal includes the introduction of traffic signals and roundabouts along the length of the proposal, which would reduce the potential for speeding. The provision of separated carriageways through the introduction of a median along the full length of the proposal would also improve road safety.

It is recognised that View Street would remain quite steep. However, a road safety audit undertaken at the completion of the concept design did not identify this as an issue. Changes to the View Street intersection would mean that vehicles exiting this local road would not be able to turn right onto the Great Western Highway (View Street would be left-in left-out only). The increased width of the highway would also enable vehicles to manoeuvre more easily.

The proposal is designed to the RMS road design guide and would be further reviewed by RMS road safety section during detailed design.

2.5 Noise and vibration

2.5.1 Operational noise

Submission number(s)

2, 5

Issue description

- Noise impacts will increase as a result of the road being closer to some houses.
- Operational noise will increase and the proposal should include mitigation measures such as window glazing.

Response

A construction and operational noise and vibration impact assessment was prepared for the proposal (SLR consulting 2011). A complete copy of the report is available in Appendix F of the REF and a summary of the findings is provided in Section 6.2 of the REF.

Noise levels at sensitive receivers immediately following opening of the proposal in 2015 would see minor increases (less than two dBA). The change in noise levels would be greatest at the nearest residential receivers near the roundabout proposed at Littlebourne Street. The change in noise levels at this locality, however, is predicted to be less than two dBA and would not be noticeable.

Ten years after opening, the change in noise levels as a result of the proposal and anticipated increase in traffic is predicted to be less than two dBA for most residential receivers. However, 46 properties would experience noise above the acute noise threshold (of two dBA) during day and night periods and feasible and reasonable noise mitigation measures would be considered as recommended in the REF (refer to Table 21 of Appendix F of the REF for list of properties).

Further noise assessments would be undertaken following detailed design to

determine treatment options and affected property owners would be consulted.

2.5.2 Operational vibration

Submission number(s)

5

Issue description

- Vibration impacts to properties along the highway would increase as a result of the highway being moved closer to houses.

Response

A description of the proposed upgrade, including materials to be used for the road pavement, is provided in Chapter 3 of the REF. The proposed road pavement would be smoother than the current road. It is therefore anticipated that operational vibration impacts would be less than the current situation and are unlikely to impact properties which would be closer to the highway as a result of the proposal.

2.6 Traffic and access

2.6.1 Operational traffic

Submission number(s)

6, 10

Issue description

- A number of issues were raised regarding the proposed intersection treatments including:
 - Traffic lights at Stockland Drive are not required. A roundabout at Stockland Drive should be considered to allow for the free flow of traffic.
 - Three sets of traffic lights at the western section of the Great Western Highway should be avoided to minimise driver frustration.
 - A roundabout at Gilmour Street and/or Boyd Street should be considered to maintain free flow of traffic.
 - Traffic lights at Pat O'Leary Drive are not required.
 - The free flow of traffic should be encouraged by limiting traffic controls such as traffic lights.
- The existing intersection at Pat O'Leary Drive is unsafe, in particular for cyclists, as traffic from the Great Western Highway access the new McDonald's outlet.

Response

Section 2.6 of the REF describes the process undertaken to determine the combination of intersection treatments that would work together to provide the most efficient road for predicted 2025 traffic. Between September 2010 and November 2010, a period of preliminary community and stakeholder consultation was undertaken. The aim of this consultation was to identify issues and potential intersection options for the duplication of the Great Western Highway. The community was provided with, and was invited to comment on, a preliminary options plan showing potential treatments for each intersection. Seven intersection options

were developed and considered at a value engineering workshop in November 2010 which took into account the community feedback. The seven options were considered against the proposal objectives and the criteria outlined in Section 2.3 and Table 2-2 of the REF respectively. Following the workshop, a preliminary preferred intersection option was selected. Traffic modelling was applied to the preferred option to ensure it would function appropriately until at least 2035. It also took into consideration future developments during this period. Section 2.6.1 identifies the intersection options considered, Section 2.6.2 identifies the reasons for the selection of the preliminary preferred option, Section 2.6.3 summarises the results of the traffic modelling and refinements made to the intersection treatments.

A roundabout was initially considered for Stockland Drive. However, traffic modelling determined that a roundabout at Stockland Drive would not provide an adequate level of service until 2035 compared to traffic lights (refer to Section 2.6.2 of REF).

Traffic lights at the western section of the Great Western Highway are required to improve local access and allow right turn movements onto and out of the Great Western Highway. Traffic lights would be coordinated to minimise impacts on traffic flow as per the safeguard identified in Section 6.1 of REF.

A roundabout at Gilmour Street was considered (refer to Section 2.6.1 and 2.6.2) during concept design development. However, a roundabout at Gilmour and/or Boyd streets would impact local heritage items and/or have higher acquisition costs.

Options not to include traffic lights at Pat O'Leary Drive were considered (refer to Section 2.6.1 and 2.6.2 of the REF). However, the proposed signals at Pat O'Leary Drive reflect the changing nature of this section of the proposal, with a new McDonald's outlet being constructed and the change of traffic flows and types of movements that it will bring. Increased pedestrian traffic has the potential to occur in this area and pedestrian crossings at traffic signals would cater for safe crossing movements.

Section 6.1 of the REF assesses the operational traffic impacts of the proposal. A traffic assessment was undertaken by Cardno in 2011 and is provided in Appendix E of the REF. The traffic assessment determined that the proposed combination of traffic lights and roundabouts provides the most efficient solution when taking into consideration local access requirements for both traffic and pedestrians and flow of traffic, in addition to considering property acquisition and other criteria listed in Table 2-2 of the REF. The concept design would be further refined and safeguards from the REF implemented to further avoid, minimise and/or mitigate impacts to traffic during operation.

Section 2.6.2 of the REF recognises the change of traffic flow and types of movements which would occur as result of the new McDonald's outlet being constructed in Kelso. Furthermore, increased pedestrian/cyclist traffic has the potential to occur in this area. The proposed signalised intersection would cater for these changes and improve safety. The proposal as described in Chapter 3 also includes a shared bicycle and pedestrian path along the full length of the highway.

2.7 Consultation

Submission number(s)

8

Issue description

- A wider regional consultation process should have been undertaken to assess works on a major inter-regional highway such as the Great Western Highway.

Response

Chapter 5 of the REF details the consultation process that was undertaken as part of the development of the proposal. A community update was letterboxed to over 17,500 households and businesses in Bathurst and surrounding areas and advertisements were also placed in local papers and the RMS website. Consultation aimed to inform the local and surrounding community of the proposal to upgrade the road and to seek feedback from the community within the immediate vicinity of the works and neighbouring suburbs. Local and State government agencies were also consulted to obtain both local and regional feedback on the proposal. The proposal has also been advertised on the RMS website throughout its development to allow any interested stakeholders to provide feedback.

Community consultation was undertaken in two stages. In the first stage, the community and stakeholder consultation was undertaken to seek feedback for the development of a preliminary concept design. The second stage sought feedback on the preferred concept design developed following stage 1 and further environmental investigations.

3 Issues outside the scope of the proposal

3.1 Flooding impacts west of the proposal site

Submission number(s)

7, 9, 11, 13

Issue description

- Flooding at the western end of Kelso causes westbound traffic to backup past Littlebourne Street. Traffic lights should be retained at Littlebourne Street to allow traffic travelling from Oberon to enter the Great Western Highway in the event that queues backup past Littlebourne Street during floods, especially as no traffic lights would be provided east of this intersection.
- The section of the highway just west of the Gilmour Street intersection to the Evans Bridge across the Macquarie River is prone to flooding. Bathurst Regional Council has a plan to create a channel from Raglan Creek to Macquarie River to prevent future road closures resulting from the flooding of Raglan Creek. However, this is not a complete solution and the proposed highway upgrade should involve the raising of the entire flood prone section of highway above the 100 year flood level using, for example, box culverts.
- A causeway at the western end of the proposal would enable water to flow below the road and onto the playing fields during flooding events. This would enable the highway to remain open.
- Traffic along the Great Western Highway is severely impacted by flooding of Raglan Creek. The proposal should be extended to Evans Bridge and include:
 - Raising the highway by about five metres across the floodplain.
 - Provide adequate drainage under the highway (culverts).
 - Provide adequate drainage along Raglan Creek.
 - Divert Raglan Creek directly down to the Macquarie River so that flows travel behind Bunnings and Good Guys and doesn't do a right hand turn and then floods the Great Western Highway

Response

Section 2.6.2 of the REF outlines the justification of the proposed roundabout at Littlebourne Street. The roundabout at the eastern end, combined with the Littlebourne Street roundabout and the u-turn bay on Stockland Drive provide the most appropriate solution for managing the competing needs of through traffic versus local traffic movements. These features would address the loss of direct right turn movements into or out of properties along the proposal site, created by the addition of the extra lanes and the central raised concrete median, by providing u-turn options at strategic locations. Furthermore, it should be noted that traffic lights would be installed east of Littlebourne Street at Pat O'Leary Drive which has the potential to create a break in oncoming traffic in the event of extensive queues resulting from flooding at the western end of proposal site. The installation of CCTV cameras is also being investigated by RMS to allow the monitoring and optimisation of traffic signals at specific times including during floods, as well as peak periods associated with events at Mount Panorama.

Investigations to address the flooding issues to the west of the proposal site are currently being undertaken by RMS, Bathurst Regional Council and NSW Office of Water. Design for a diversion channel and associated works to raise the banks of the Raglan Creek to better contain flows in the waterway area are currently under review by NSW Office of Water and are likely to be put in place prior to the proposed Great Western Highway widening moving to the construction phase.

3.2 Bypass

Submission number(s)

8

Issue description

- As the Great Western Highway is a major inter-regional connecting road, a bypass is required to properly address the competing needs of local and through highway traffic.

Response

Section 2.1 and 2.3 of the REF describes the need and objectives of the proposal which includes, but is not limited to, the requirement to cater for the mix of through, local and tourist traffic and improve road safety for motorists and pedestrians.

The population of the Bathurst Regional Local Government Area is forecast to increase over the next 21 years to around 46,300 in 2031 (Bathurst Regional Council, 2007). Developments such as social housing and industries are also currently under construction or being planned at Kelso. This would increase pressure on the local road network, including the Great Western Highway.

The REF recognises that local traffic competes with through traffic such as long haul transport vehicles. However, the proposal is necessary to address safety issues with a high number of rear-end crashes and capacity issues due to the ongoing growth of the area. It meets the needs and objectives outlined in Section 2.1 and 2.3 of the REF. A bypass would not resolve the existing safety issues and present and future traffic concerns for local traffic.

3.3 Traffic impacts east of the proposal site

Submission number(s)

11

Issue description

- Heavy vehicles leaving Kelso towards Sydney are slower than general traffic due to the uphill section of highway east of Ashworth Drive. This leaves vehicles backed up behind slower vehicles before they can overtake past the Bathurst Airport turnoff where the Great Western Highway becomes two lanes eastbound. A roundabout at Ashworth Drive would increase this impact as heavy vehicles would need to slow down to manoeuvre around the roundabout. The provision of two lanes eastbound should be considered past the Bathurst Airport turnoff as part of the proposal.

Response

The proposal includes the widening and upgrade of the Great Western Highway through Kelso just past Ashworth Drive. A dual carriageway is currently not required any further east due to the lower traffic volumes on the eastern end of the proposal, and further east from there.

Currently, queues of vehicles behind slower heavy vehicles are experienced on the section of the Great Western Highway immediately east of the proposal. However, these are not significantly slower than the signposted 80 km/h speed limit. These queues form along the whole length of the proposal site and result from the limited overtaking opportunities as a result of the existing single carriageway eastbound lane configuration. The proposal is expected to eliminate the development of queues behind heavy vehicles as the two eastbound lanes would improve overtaking opportunities. These queues could still potentially form past Ashworth Drive as the Great Western Highway becomes a single carriageway. However, these will be largely reduced from the current level. It is not considered to be economically viable to reduce queuing further by construction of additional works. The proposed roundabout design geometry is not expected to slow the majority of straight through vehicles significantly below the 60 km/h speed limit.

3.4 Road safety

Submission number(s)

12

Issue description

- Pot holes, especially down Raglan Hill, are a hazard for traffic and should be fixed.

Response

This section of the Great Western Highway is an older section of pavement and is prone to potholes when periods of high rainfall are experienced. Due to recent flood events, RMS has had to prioritise sections of the whole network that need to be repaired. Road crews are repairing recent damage caused to the whole network after recent flood events. RMS is endeavouring to carry out maintenance of this section in a timely manner.

4 Environmental management

The REF for the Great Western Highway upgrade at Kelso identified the framework for environmental management, including management and mitigation measures that would be adopted to avoid or reduce environmental impacts (Chapter 7 of the review of environmental factors).

Should the proposal proceed, environmental management will be guided by the framework and measures outlined below.

4.1 Environmental management plans (or system)

A number of safeguards and management measures have been identified in order to minimise adverse environmental impacts, including social impacts, which could potentially arise as a result of the proposal. Should the proposal proceed, these management measures would be incorporated into the detailed design and applied during the construction and operation of the proposal.

A Project Environmental Management Plan (PEMP) and a Contractors Environmental Management Plan (CEMP) will be prepared to describe safeguards and management measures identified. These plans will provide a framework for establishing how these measures will be implemented and who would be responsible for their implementation.

The plans will be prepared prior to construction of the proposal and must be reviewed and certified by environment staff, western region, prior to the commencement of any on-site works. The CEMP will be a working document, subject to ongoing change and updated as necessary to respond to specific requirements. The CEMP and PEMP would be developed in accordance with the specifications set out in the: QA Specification G36 – Environmental Protection (Management System), QA Specification G38 – Soil and Water Management (Soil and Water Plan) and the QA Specification G40 – Clearing and Grubbing.

4.2 Summary of safeguards and management measures

Environmental safeguards outlined in this document would be incorporated into the detailed design phase of the proposal and during construction and operation of the proposal, should it proceed. These safeguards would minimise any potential adverse impacts arising from the proposed works on the surrounding environment. The safeguards and management measures are summarised in Table 4.1. Safeguards that are additional to those originally provided in the REF are in **bold text**.

Table 4.1: Summary of site specific environmental safeguards.

No.	Impact	Environmental safeguards	Responsibility	Timing
1	General	<ul style="list-style-type: none"> • All environmental safeguards must be incorporated within the following documents: <ul style="list-style-type: none"> ○ Project Environmental Management Plan ○ Detailed design stage ○ Contract specifications for the proposal ○ Contractors Environmental Management Plan 	Project manager	Pre-construction
2	General	<ul style="list-style-type: none"> • A risk assessment must be carried out on the proposal in accordance with Audit Pack and OSD risk assessment procedures to determine an audit and inspection program for the works. The recommendations of the risk assessment are to be implemented. • A review of the risk assessment must be undertaken after the initial audit or inspection to evaluate is the level of risk chosen for the project is appropriate. • Any works resulting from the proposal and as covered by the REF may be subject to environmental audit(s) and/or inspection(s) at any time during their duration. 	Project manager and regional environmental staff	Pre-construction After first audit
3	General	<ul style="list-style-type: none"> • The environmental contract specification G36 Environmental 	Project manager	Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		<p>Management System must be forwarded to the Roads and Maritime Services Senior Environmental Officer (Western Region) for review at least 10 working days prior to the tender stage.</p> <ul style="list-style-type: none"> A contractual hold point must be maintained until the CEMP is reviewed by the Roads and Maritime Services Senior Environmental Officer. 		
4	General	<ul style="list-style-type: none"> The Project Manager must notify the Roads and Maritime Services Environment Officer Western region at least 5 working days prior to work commencing. 	Project manager	Pre-construction
5	General	<ul style="list-style-type: none"> All businesses and residences likely to be affected by the proposed works must be notified at least 5 working days prior to the commencement of the proposed activities. 	Project manager	Pre-construction
6	General	<ul style="list-style-type: none"> Environmental awareness training must be provided, by the contractor, to all field personnel and subcontractors. 	Contractor	Pre-construction and during construction as required.
7	Traffic and Access	<ul style="list-style-type: none"> Alternative parking arrangements would be investigated to minimise impacts on local road parking. Roundabouts would be designed during detailed design to facilitate safe pedestrian movements. 	Project manager and contractor	Design and pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		<ul style="list-style-type: none"> • Existing bus services would be maintained and consultation would be undertaken with the bus service provider regarding the need for any change to bus route or bus stop location during construction. • Haulage routes would be identified and road condition surveys undertaken for local roads. • A detailed traffic management plan (TMP) would be prepared as part of the construction environmental management plan (CEMP) during the detailed design phase. The TMP would be prepared in accordance with the RMS' Traffic Control at Worksites and Australian Standard 1742.3-2009 Manual of uniform traffic control devices - Traffic control for works on roads and would include the guidelines, general requirements and procedures to be used when activities or areas of work have a potential impact on existing traffic arrangements. The TMP would include but not be limited to: <ul style="list-style-type: none"> ○ Identify haulage routes and ensure impacts to local routes are minimised. ○ Identify the traffic management requirements during construction. 		

No.	Impact	Environmental safeguards	Responsibility	Timing
		<ul style="list-style-type: none"> ○ Ensure the continuous, safe and efficient movement of traffic for both the public and construction workers. ○ Determine the number and width of traffic lanes in operation. Ensure at least one lane of traffic is maintained in each direction at all times. ○ Maintain the capacity of local roads. ○ Determine temporary speed restrictions to ensure safe driving environments around work zones. ○ Minimise impacts on Great Western Highway and local traffic. ○ Provide access to local roads and properties. ○ Provide temporary works and traffic signals. ○ Identify traffic barrier requirements and placement. ○ Include methods for implementing the traffic management plan. ○ Include methods for minimising road user delays. ○ Provide appropriate warning and advisory signposting. ○ Consider other developments that may also be under construction, to minimise traffic conflict and congestion that may occur due to the cumulative increase in construction 		

No.	Impact	Environmental safeguards	Responsibility	Timing
		<p>vehicle traffic.</p> <ul style="list-style-type: none"> ○ Include requirements and methods to consult and inform local community of impacts on local road network and traffic. • A detailed access management plan would be prepared as part of the construction environmental management plan (CEMP) during the detailed design phase. The plan would include but not limited to <ul style="list-style-type: none"> ○ Requirements to consult with affected businesses and residents prior to any impacts to accesses ○ Provisions to maintain safe access to businesses and residences. ○ Provisions to maintain safe access to services such as bus stops. ○ Requirements to provide safe access from to and from either side of the road for pedestrians at strategic locations such as bus stops and businesses. • Maintain safe pedestrian and cyclist access for safe movements along Great Western Highway. • The proposal would be designed to the RTA road design guide 		

No.	Impact	Environmental safeguards	Responsibility	Timing
		and would be reviewed by RMS road safety section.		
8	Traffic and Access	<ul style="list-style-type: none"> The signalised intersections would be co-ordinated to minimise impacts on traffic flows. 	Project manager	Operation
9	Noise and vibration	<ul style="list-style-type: none"> Further noise assessments would be undertaken during detailed design to determine affected properties and treatment options. Affected property owners would be consulted. Investigations of all feasible and reasonable noise control options would be undertaken. All feasible and reasonable noise mitigation treatments would be considered for the affected receivers as part of the proposal to reduce traffic noise levels at residences to within the applicable noise limits. Feasible and reasonable noise mitigation measures would also be considered at residences identified as having existing 'acute' noise levels and where such levels have been predicted for the design year (ten years after opening of the proposal) as a result of the proposal. This assessment would be undertaken in accordance with DECCW's Environmental Criteria for Road Traffic Noise (EPA 1999) and the RTA's Environmental Noise Management Manual (RTA 2001). 	Project manager and contractor	Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		<ul style="list-style-type: none"> • A construction noise and vibration management plan (CNVMP) taking into consideration OEH/EPA's Interim Construction Noise Guideline (DECCW 2009) would be developed during finalisation of the construction methodology and the detailed design phase to mitigate noise impacts upon sensitive receivers. The CNVMP would include but not be limited to: <ul style="list-style-type: none"> ○ Identification of potentially affected properties and residences. ○ Requirement for dilapidation surveys for buildings within 50 metres of the construction works. ○ A risk assessment to determine potential risk for discrete work elements/activities likely to affect residents. ○ A map indicating the locations of likely potential impacts. ○ Mitigation measures to reduce excessive noise during construction activities including those associated with truck movements. ○ A process for assessing the performance of the implemented mitigation measures. ○ A process for resolving issues and conflicts. 		
10	Noise and vibration	<ul style="list-style-type: none"> • The configuration of the compound and stockpile site would be 	Contractor	During construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		<p>planned so that noise impacts to nearby businesses would be minimised. Noisy plant and machinery would be located away from any noise receivers.</p> <ul style="list-style-type: none"> • Selection of construction plant and equipment would take into consideration noise outputs so that noise impacts are minimised. • Vibration emission levels from each plant would be measured on site before the start of construction works. Safe buffer distances should be determined to avoid structural damage to potential receivers. • Dilapidation surveys for buildings within 50 metres of the construction works would be prepared in accordance with the Construction Noise and Vibration Management Plan (CNVMP). • Where actual construction activities differ from those assessed in the noise and vibration assessment (Appendix F), more detailed design of noise control measures may be required once specific items of plant and construction methods have been chosen and assessed on site. • Works would be carried out during standard working hours (i.e 7am–6pm Monday to Friday, 8am–1pm Saturdays). Any work 		

No.	Impact	Environmental safeguards	Responsibility	Timing
		<p>that is performed outside normal work hours or on a Sunday or public holiday is to minimise noise impacts in accordance with RMS' <i>Environmental Noise Management Manual</i> (RTA 2001), "Practice Note vii – Roadworks Outside of Normal Working Hours" and the <i>Interim Construction Noise Guidelines</i> (DECC 2009). This would include notifying the local community of any works planned to be undertaken outside standard construction hours.</p> <ul style="list-style-type: none"> • Regular updates on the proposal would be provided to the community. • A community liaison phone number and site contact would be provided so that noise and or vibration-related complaints if any can be received and addressed in a timely manner. 		
11	Noise and vibration	<ul style="list-style-type: none"> • Post construction noise monitoring of operational noise would be undertaken in accordance with Practice Note VIII of the RMS ENMM, within two to 12 months of proposal completion at selected representative locations along the proposal to give a minimum of seven days of data (excluding adverse weather). Where noise levels exceed those originally predicted further investigations would be undertaken to determine whether 	Project manager	operation

No.	Impact	Environmental safeguards	Responsibility	Timing
		additional mitigation measures need to be considered.		
12	Hydrology	<ul style="list-style-type: none"> The existing culvert depth at site 1 would be confirmed during detailed design of the proposed culvert to convey 100 year ARI flow events. . Scour protection and energy dissipaters upstream and downstream of all culverts, would be refined during detailed design. Further hydrological and hydraulic assessment would be undertaken during detailed design where required, in particular should the section of creek line at Ashworth Drive be piped. Channel material type would be examined at the detailed design stage in conjunction with a soil erodibility assessment. A flood management plan would be prepared to manage any potential flooding of the highway during construction, in particular at the western end of the proposal site near Stockland Drive. 	Project manager and contractor	Pre-construction
13	Hydrology	<ul style="list-style-type: none"> Creek lines and culverts would be regularly maintained so that the 100 year ARI capacity is retained (e.g. clearance of silt from culvert). 	Project manager	Operation
14	Soil, landscape and	<ul style="list-style-type: none"> Detailed design of the bridge and culverts would include 	Project manager and	Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
	water quality	<p>measures to minimise potential scouring of banks.</p> <ul style="list-style-type: none"> • Scour protection devices would be installed where required to reduce flow velocity and potential scouring and sedimentation of existing natural channels and vegetation. Detailed design would consider soft options in the first instance. However, if this is not possible, hard scour protection, for example energy dissipaters would be used. • The number, size and location of possible temporary sedimentation basins would be determined during detailed design in consultation with RMS' Senior Environmental Officer who would determine whether an additional environmental impact assessment is required for these. • A soil conservationist from the RMS Erosion, Sedimentation and Soil Conservation Consultancy Services Register would be engaged during detailed design to develop an Erosion and Sedimentation Management Report which would inform the Soils and Water Management Plan. The soil conservationist would consider (at a minimum): <ul style="list-style-type: none"> ○ Proposed staging plans for the project to ensure appropriate erosion and sediment control is possible. 	contractor	

No.	Impact	Environmental safeguards	Responsibility	Timing
		<ul style="list-style-type: none"> ○ The likely run-off from each road sub-catchment. ○ Diversion of up-slope water around the site. ○ The direction of run-off and drainage points during each stage of construction. ○ The number, locations and sizing of possible temporary sediment basins. ○ Requirements for erosion and sediment controls during construction according to the guidelines set out in <i>NSW Soils and Construction – Managing Urban Stormwater</i> Volume 1 “the Blue Book”(Landcom, 2004) and Volume 2: Main Road Construction (DECC, 2008). ● The bridge would be tested for contamination (e.g. lead) prior to demolition. Should contaminants be present appropriate methods would be detailed in the work method statement (WMS) to ensure demolition is undertaken according to relevant guidelines for the particular contaminant(s). ● The sediments in the creekline that would be dredged would be tested for contaminants. Should contaminants be present appropriate methods would be detailed in the WMS to ensure dredging and storage/disposal of dredging material is 		

No.	Impact	Environmental safeguards	Responsibility	Timing
		<p>undertaken according to relevant guidelines for the particular contaminant(s).</p> <ul style="list-style-type: none"> • A Soil and Water Management Plan (SWMP) would be prepared as part of the Construction Environmental Management Plan (CEMP) for the proposal prior to the commencement of construction. The SWMP would address the RTA <i>Code of Practice for Water Management</i> (1999), the then RTA <i>Erosion and Sedimentation Procedure</i> (2009) and incorporate specifications outlined in the <i>NSW Soils and Construction – Managing Urban Stormwater</i> Volume 1 “the Blue Book”(Landcom, 2004) and Volume 2: Main Road Construction (DECC, 2008). • The SWMP would include: <ul style="list-style-type: none"> ○ An Erosion and Sedimentation Control Plan (ESCP). ○ Identification of areas requiring management controls. ○ A maintenance schedule for on-going maintenance of temporary and permanent sedimentation controls (if determined as being required during detailed design). <p>The SWMP would be reviewed by RMS’ Senior Environmental Officer, Western Region prior to commencement of works.</p>		

No.	Impact	Environmental safeguards	Responsibility	Timing
		<ul style="list-style-type: none"> • The ESCP would include: <ul style="list-style-type: none"> ○ Staged plans for the creek diversion works. ○ Staged plans for the demolition and construction of the bridge. ○ Staged plans for the relocation of the creek line south of Ashworth Drive intersection. ○ Staged plans for dredging works upstream of the culvert 160 metres west of Ashworth Drive. ○ The provisions for prompt completion of works relating to drainage and sediment control to minimise exposure time of disturbed areas. ○ The provision of sediment and filter traps in advance of and in conjunction with earthworks operations, to prevent sediment laden run-off leaving the site. • The methodology for the demolition of the existing Boyd Creek bridge would be further refined during detailed design to minimise impacts on Boyd Creek. • A procedure would be prepared for dewatering activities in accordance with <i>Environmental Management of Construction Site Dewatering</i> (RTA2011). The procedure would include but 		

No.	Impact	Environmental safeguards	Responsibility	Timing
		<p>not be limited to:</p> <ul style="list-style-type: none"> ○ A map showing areas of the proposal that would require dewatering. ○ Detailed description and justification of all selected dewatering methods. ○ Description of onsite water reuse requirements. ○ A map showing proposed discharge locations for any offsite discharge. ○ Design requirements for each offsite discharge location to prevent erosion.. ○ Water quality objectives relevant to the type of dewatering activity. ○ Description of the water quality treatment techniques to be used. ○ Water sampling and testing regime to validate water quality prior to and (if required) during dewatering. ○ Proposed monitoring and supervision regime. ● Work Method Statements (WMS) would be prepared for high risk activities, including but not limited to, the relocation or piping of the creek line south of Ashworth Drive intersection; 		

No.	Impact	Environmental safeguards	Responsibility	Timing
		<p>the culvert works 160 metres west of Ashworth Drive, including dredging upstream of culvert; the culvert works at Littlebourne Street; and demolition and construction of Boyd Creek bridge. The WMS would include, but not be limited to, the following:</p> <ul style="list-style-type: none"> ○ Description of works/activities including machinery. ○ Outline of the sequence of the works/activities, notably creek diversion works and any dewatering requirements in accordance with the <i>Environmental Management of Construction Site Dewatering</i> (RTA 2011). ○ An environmental risk assessment to determine potential risks to discrete work elements or activities likely to affect the environment or residents. ○ A map indicating the locations of likely potential environmental impacts. ○ Evaluation of methods to reduce environmental risks. ○ Mitigation measures to reduce environmental risks. ○ A process for assessing the performance of the implemented mitigation measures. ○ A process for resolving environmental issues and conflicts. ○ Emergency procedures for chemical spills and other 		

No.	Impact	Environmental safeguards	Responsibility	Timing
		<p data-bbox="629 300 1025 331">potential emergency incidents.</p> <ul style="list-style-type: none"> <li data-bbox="517 352 1368 485">• The WMS would be forwarded by the Project Manager to the Senior Environmental Officer, Western Region for review and approval prior to commencement of works. <li data-bbox="517 505 1402 1299">• A site stabilisation plan would be prepared as part of the CEMP. The plan would include but not be limited to the following: <ul style="list-style-type: none"> <li data-bbox="573 660 1402 740">○ Identification and mapping of areas along the length of the proposal requiring stabilisation. <li data-bbox="573 761 1305 793">○ Risk assessment for disturbed areas and stockpiles. <li data-bbox="573 813 1070 845">○ Detailed methods for stabilisation. <li data-bbox="573 866 1335 898">○ Develop a monitoring program for the stabilised areas. <li data-bbox="573 919 1402 999">○ Develop a process for determining the success of stabilised areas or methods. <li data-bbox="573 1019 1402 1299">○ Develop a process for identifying additional stabilisation methods. <ul style="list-style-type: none"> <li data-bbox="629 1118 1312 1251">▪ All high risk areas would be stabilised within two weeks. This would include as minimum all creek works. <li data-bbox="629 1272 1361 1299">▪ All medium risk areas would be stabilised within one 		

No.	Impact	Environmental safeguards	Responsibility	Timing
		<p>month</p> <ul style="list-style-type: none"> • Testing for contaminated materials would be undertaken at the proposed excavation areas adjacent to the service stations and any other industrial sites with potential for contamination to occur. Should contaminated material be found, then a procedure would be developed to manage the contaminated material in terms of rehabilitation requirements, waste classification and subsequent transport and disposal requirements. • An incident emergency spill plan would be developed and incorporated into the CEMP. The plan would include measures to avoid spillages of fuels, chemicals, and fluids onto any surfaces or into any adjacent/nearby waterways and an emergency response plan. Emergency spill kits would be kept onsite at all times. 		
15	Soils, landscape and water quality	<p><i>Erosion and sedimentation</i></p> <ul style="list-style-type: none"> • Progressive erosion and sediment control plans would be prepared and implemented. • Sediment and erosion controls (including temporary sedimentation basins) would be implemented before any 	Contractor	During construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		<p>construction commences and inspected regularly, particularly after a rainfall event, and maintenance works undertaken as needed.</p> <ul style="list-style-type: none"> • Where possible, clearing (including weed species) in areas prone to sheet flows would avoid ripping and grubbing, so as to preserve the root mass to provide stabilisation as protection against erosion. • Clearing of vegetation from riparian areas would use the cut stump method wherever possible to minimise the potential of erosion of stream banks. • Stockpiles would be managed in accordance with the <i>Stockpile Site Management Guideline</i> (RTA 2011). • Batters would be stabilised using appropriate ground cover. • Disturbed surfaces would be compacted or track rolled in anticipation of rain events to reduce the potential for erosion. • Topsoil would be stockpiled separately and ameliorated for possible reuse in landscaping and rehabilitation works. • Controls would be implemented at entry and exit points to minimise the tracking of soil and particulates onto pavement surfaces. 		

No.	Impact	Environmental safeguards	Responsibility	Timing
		<ul style="list-style-type: none"> • Any material transported onto pavement surfaces would be swept and removed at the end of each working day. • Native trees around creek lines would be retained where possible to minimise potential erosion impacts. <p>Water quality</p> <ul style="list-style-type: none"> • Construction works would be undertaken in line with RMS' Guideline for Construction Water Quality Monitoring. • The OEH/EPA would be notified of any incidents resulting in environmental harm as per part 5.7 of the <i>Protection of the Environment Operations Act 1997</i>. • Should a spill occur during construction, the incident emergency spill plan would be implemented, and the RMS Regional Environmental Officer for the project would be contacted. Incidents and spills potentially affecting the waterways would also be reported to the Central West Catchment Management Authority's incident notification hotline. • All fuels, chemicals, and liquids would be stored at least 50 metres away from any waterways or drainage lines and would be stored in an impervious bunded area within the compound 		

No.	Impact	Environmental safeguards	Responsibility	Timing
		<p>site.</p> <ul style="list-style-type: none"> • The refuelling of plant and maintenance of machinery would be undertaken in impervious bunded areas. • Vehicle wash downs and/or concrete truck washouts would be undertaken within a designated bunded area of an impervious surface or undertaken off-site. • Machinery would be checked daily to ensure there is no oil, fuel or other liquids leaking from the machinery. • In the event that indications of contamination are encountered (such as odorous or visually contaminated materials), work in the area would cease until an environmental consultant can advise on the need for remediation or other action, as deemed appropriate. • Measures would be put in place to make sure any debris from the demolition of the bridge is captured prior to reaching the waterway. 		
16	Non-aboriginal heritage	<ul style="list-style-type: none"> • RMS would endeavour to further minimise any impacts to identified heritage items during the detailed design. • Should the proposal be altered in a way to potentially impact further on any identified items of heritage significance, further 	Project manager	Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		<p>assessment would be undertaken.</p> <ul style="list-style-type: none"> • A Heritage Management Plan would be prepared as part of the CEMP. The plan would include, but not be limited to the following: <ul style="list-style-type: none"> ○ Sensitive areas mapped which clearly identifies the items and exclusions zones. ○ Mitigation measures to avoid risk of harm including dilapidation surveys. ○ Process to communicate heritage management and mitigations measures, risk and responsibilities through environmental awareness training. 		
17	Non-aboriginal heritage	<ul style="list-style-type: none"> • Dilapidation surveys would be undertaken for all heritage buildings prior and after construction on heritage items along the proposal. Should these buildings be considered more susceptible to vibration, reduced vibration criteria levels may be applicable and subsequently adopted during the selection process for suitable equipment to be used in the vicinity of these buildings. • The planting of local native species should be considered to 	Contractor	During construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		<p>soften the appearance of the construction of new elements such as paths, retaining walls, steps and areas of minor cut/fill.</p> <ul style="list-style-type: none"> • Where small retaining walls are required along property frontages a consistency in treatment would be implemented to emphasise the strength and character of the streetscape. • All construction personnel would undertake a heritage induction prior to construction works commencing. • If non-Aboriginal heritage items are uncovered during the works, all works in the vicinity of the find must cease and the Senior Regional Environmental Officer contacted immediately. Works in the vicinity of the find must not re-commence until clearance has been received from those RMS officers and the Office of Environment and Heritage. The unexpected finds procedure (RTA 2011) would be implemented including formal heritage impact assessments undertaken where required and management plans developed. 		
18	Biodiversity	<ul style="list-style-type: none"> • Exclusion zones, in accordance with RMS' Biodiversity Guidelines (RTA 2011), for weeds and riparian zones that do not need to be accessed would be established before works start. 	Project manager and contractor	During construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		<ul style="list-style-type: none"> • Disturbance would be kept to a minimum. Roundabout works at the western end of the site would be restricted to the construction footprint. • Revegetation and landscaping across the proposal site would be undertaken in accordance with a landscape management plan. An appropriate landscape planting design would be implemented to plant native, locally occurring species to replace vegetation removed as part of the proposal. • A weed management plan would be prepared for the proposed works during detailed design and would include but not be limited to the following: <ul style="list-style-type: none"> ○ Measures to ensure Weed species are not to be mulched and re-used on site as spread of propagules would occur. ○ Class 3 Noxious Weeds identified on site (Columbus Grass) would be managed in accordance with the management plans prepared by the Macquarie County Council LGA. ○ Class 4 Noxious Weeds identified on site (African Boxthorn, African Lovegrass, Bathurst Burr, Blackberry, Large-leaved Privet and Willow) would be managed in 		

No.	Impact	Environmental safeguards	Responsibility	Timing
		<p>accordance with the management plans prepared by the Macquarie County Council LGA.</p> <ul style="list-style-type: none"> ○ The use of herbicides would be used to control exotic species at the site and suitable application methods would be employed to ensure no impacts occur to adjacent vegetation within residential lands. Herbicides would be used in accordance with the manufacturer's guidelines. Herbicides would not be used when rain is forecast. • Erosion and sediment control measures would be implemented at the creek lines and swamp area to prevent sediment-laden runoff reaching waterbodies. • Wastewater generated from the works is to be treated to prevent the release of dirty water into drainage lines and/or Raglan and Boyd Creeks. • Water quality control measures are to be used to prevent any materials (e.g. concrete, grout, sediment etc) entering Raglan and Boyd Creeks. A boom would be at hand in the case of any spills or material entering the creeks. • All fuels, chemicals and liquids are to be stored in an impervious bunded area a minimum of 50 metres away from 		

No.	Impact	Environmental safeguards	Responsibility	Timing
		<p>waterways where possible.</p> <ul style="list-style-type: none"> • Machinery would be cleaned prior to entering and leaving the site to ensure that weed seeds and propagules and soil or other pathogens are not imported to the site. • Details of the local veterinary and/or wildlife carer would be available onsite to be contacted should any injured fauna be encountered during the tree clearing process. • Surveys of the bridge and culverts would be undertaken to determine the presence of any bats using the structures prior to construction. Should bats be found, all works would cease and the Regional Senior Environmental Officer contacted immediately. A management plan would be prepared to ensure these are not impacted during construction activities. <p>Green and Golden Bell Frog</p> <ul style="list-style-type: none"> • Targeted surveys for Green and Golden Bell Frogs would be undertaken prior to works commencing (in addition to targeted searches undertaken as part of this REF) during the appropriate survey time from September to March. • Pre-clearance surveys would also be undertaken within the 		

No.	Impact	Environmental safeguards	Responsibility	Timing
		<p>proposal site (including construction area) for Green and Golden Bell Frogs in accordance with the RMS Biodiversity Guidelines (RTA 2011).</p> <ul style="list-style-type: none"> • If any Green and Golden Bell Frogs are found prior to or during the works, works would cease and the RMS Senior Environmental Officer would be contacted for advice on how to proceed. A management plan would be developed and would include: <ul style="list-style-type: none"> ○ Frog exclusion fencing. ○ Management requirements from the <i>Hygiene Protocol for the control of disease in frogs</i> (Wellington and Haering 2008). <p>Aquatic</p> <ul style="list-style-type: none"> • Removal of native riparian vegetation would be minimised where possible. • To compensate for the loss of aquatic and riparian habitat and biota from the creek re-alignment and bridge construction, comparable vegetation assemblages would be created in the realigned reaches. A riparian vegetation management plan would be prepared in accordance with RMS Biodiversity 		

No.	Impact	Environmental safeguards	Responsibility	Timing
		<p>Guidelines (2011) and established guidelines for river rehabilitation (e.g. Rutherford et al. 2000). The plan would be incorporated into the CEMP. The plan would include, but not be limited to the following:</p> <ul style="list-style-type: none"> ○ Restoration of the natural creek geomorphology to reduce velocity and scour during high flow events and natural bed forms, such as an alternating sequence of pools, riffles and runs. ○ Establishment of a complete and broad riparian habitat comprising native species currently present adjacent to the creek. ○ Stabilised channel bank and bed and the protection of exposed soil until riparian vegetation is completely re-established. ○ Clearly defined vegetation clearing boundaries, including a map representing areas requiring protection. ○ Provision for a suitably qualified ecologist to be engaged to visit the site prior to any clearing works to clearly demarcate vegetation protection areas and conduct a pre-clearing survey. 		

No.	Impact	Environmental safeguards	Responsibility	Timing
		<ul style="list-style-type: none"> ○ Management measures identified as a result of the pre-clearing survey report and nominated actions to respond to the recommendations made. ○ Details of training to be provided to all personnel taking part in construction activities with regards to the importance of clearing limits and remnants/individual trees of significant value. ○ A weed management plan. ● Snag management would be undertaken using the following hierarchy (low to high impact): <ol style="list-style-type: none"> 1. Lopping - whereby protruding limbs are sawn-off and allowed to sink to the river bed. 2. Realignment - whereby a snag is rotated from its existing position. 3. Relocation - whereby a snag is physically moved from one location in the waterway to another location. 4. Removal - the snag is completely pulled from the water (i.e. de-snagging). <p>DPI (Fisheries) guidelines should be used and an aquatic</p> 		

No.	Impact	Environmental safeguards	Responsibility	Timing
		<p>ecologist would be present on site when working with snags that require lopping, realignment, relocation and/or removal. DPI (Fisheries) would be notified and given 28 days to respond, prior to the removal of any snags.</p> <ul style="list-style-type: none"> • Removal/relocation of snags would be undertaken so as to cause the least disturbance to the bed or nearby sensitive aquatic habitat. • Removal of in-stream habitat at all crossings would be kept to a minimum to reduce impacts to fish habitat. • Notification to DPI (Fisheries) of reclamation/dredging works has been undertaken. Consideration would be given to any response within 28 days of notification. Works would be undertaken in consideration of any recommendations given by DPI (Fisheries). • In-stream habitat availability, sediment type and riparian vegetation would be replicated where possible. Where vegetation will be planted to rehabilitate the new creek, only native species natural to the region would be used. The Core Riparian Zone at each creek crossing would be rehabilitated to 20 metres wide where possible. 		

No.	Impact	Environmental safeguards	Responsibility	Timing
		<ul style="list-style-type: none"> • If Boyd Creek and its unnamed tributary is relocated, the new channel would be constructed and stabilised prior to water diversion from the existing channel with soft engineering techniques and vegetation. • If the option of piping the section of creek is selected, the pipe would be designed to reduce the potential impacts to fish by ensuring water flow is not concentrated and flows are maintained through the pipe during periods of reduced flow. • If the option of piping the creek and its unnamed tributary be selected the detailed design would investigate ways to minimise the overall length of the pipe. • The realigned creek would be constructed and stabilised prior to water diversion from the existing channel to the new channel with soft engineering techniques and vegetation. • Prior to construction, a procedure would be developed to manage Eel-tailed Catfish if they are found on site. • Staff on site would be made aware of the potential to come across Eel-tailed Catfish and the procedure to follow if they are identified on site. • Where practicable, construction works would be staged to 		

No.	Impact	Environmental safeguards	Responsibility	Timing
		<p>minimise the total disturbance.</p> <ul style="list-style-type: none"> • Temporary works, flow diversion barriers and in-stream sediment control barriers would be removed as soon as practicable and in a manner that will not exacerbate future channel erosion. <p>Fish passage</p> <ul style="list-style-type: none"> • The new channel at crossings 1 and 1A would be constructed before the diversion of flow takes place and filling of the natural channel commences. Diversion would be scheduled during periods of predicted low flow to minimise impacts to fish movement and the number of fish likely to be temporarily stranded in the existing watercourse. If pools remain in the natural creek after diversion, remaining native fish would be translocated to the diverted creek or upstream of the works by a licensed aquatic ecologist. • No creek works would be undertaken during periods of high flow/flood events. • Design and construction of the bridge and the installation of floodplain culverts, would be in accordance with requirements for fish passage and in consultation with DPI (Fisheries) where 		

No.	Impact	Environmental safeguards	Responsibility	Timing
		<p>necessary.</p> <ul style="list-style-type: none"> • Should detailed design determine that fish passage needs to be temporarily blocked for construction purposes a Permit un part 7 of the Fisheries Management Act would be sought. 		
19	Landscape character and visual impacts	<ul style="list-style-type: none"> • The design objectives and principles and the concept design detailed in section 6 of Tract Consultants (2011) are to be carried through into the detailed design development and construction phases. • Specific measures to mitigate the potential landscape character and visual impact of the upgrade in detailed design include: <ul style="list-style-type: none"> ○ Chainage 54866 to 57700 (full length of the proposal) - Use of colour or planting would be used to assist in breaking up extent of pavement. ○ Eastern Approach <ul style="list-style-type: none"> ▪ 55040 to 55580 (Ashworth Drive intersection and approaches) – The existing pavement would be removed and revegetated. Revegetation would consider sightlines to the signage/panner. The potential to relocate signage/panner closer to revised alignment would be considered. 	Project manager	Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		<ul style="list-style-type: none"> ▪ 55240 to 55340 (Ashworth Drive intersection) – The urban design and landscape plan would treat this section as a gateway design element. ▪ 55040 to 55460 (Southern boundary from start of Boyd Creek) – A natural creek line would be created, including the restoration of existing eroded channels. ▪ 55100 to 55320 (Southern boundary) – This section of the proposal would be revegetated to reflect natural community. ○ Residential, commercial and industrial zone <ul style="list-style-type: none"> ▪ 56220 to 57120 (Northern verge between Littlebourne Street and Boyd Street) - Appropriate street trees would be re-established. ▪ 56220 to 56300 (Littlebourne Street intersection) and 56480 to 56600 (Northern Boundary) – Materials selected would provide a link to Bathurst and enhance character, for example the use of brick for retaining walls. ▪ 56480 to 56540 (Southern boundary) - Colour of material would be recessive to enable wall to be blended 		

No.	Impact	Environmental safeguards	Responsibility	Timing
		<p>in with landscape.</p> <ul style="list-style-type: none"> ○ Western approach <ul style="list-style-type: none"> • 57520 – 57700 (Southern boundary) - Batter slope would be blended into the floodplain through the use of flatter grades and colouring of the path. • All recommendations provided in Tract Consultants (2011) to minimise impacts to visual amenity would be considered during detailed design. • The urban and landscape design plan would be further developed during detailed design in consultation with Bathurst Regional Council and representatives of community groups (such as Greening Australia and local heritage groups). • The landscape design would be developed at the detailed design stage and would determine the planting mass required including consideration of maintenance requirements. • The potential for black ice and use of deciduous trees would be considered when developing the landscape design during the detailed design stage. 		

No.	Impact	Environmental safeguards	Responsibility	Timing
20	Air quality	<ul style="list-style-type: none"> • Any stockpiles and general areas with the capacity to cause dust would be stabilised, such as water spraying, compaction or progressive revegetation or stabilisation with cover crops, to suppress dust emissions. • Stabilisation of disturbed surfaces would take place as soon as practicable. • Stockpiles would be managed in accordance with the <i>RMS Stockpile Site Management Guidelines</i>. • Construction equipment would be properly maintained to ensure exhaust emissions comply with the <i>Protection of the Environment Operations Act 1997 (PoEO Act)</i>. • Should wind reach a level where dust cannot be controlled then the dust generating activity would cease. • Local residents would be advised of hours of operation and duration of works and supplied with a contact name and number for queries regarding air quality. 	Contractor	During construction
21	Socio-economic and land use impacts	<ul style="list-style-type: none"> • During the detailed design phase, the construction methodology would be further developed to incorporate alternative parking and access arrangements for businesses 	Project manager	Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		<p>and residents.</p> <ul style="list-style-type: none"> Impacts on minimum lot sizes, setbacks and floor space ratios would be further investigated during detailed design when final acquisition requirements are known. Further investigations would be undertaken during detailed design to minimise property impacts where possible and property owners would be consulted during the process. Detailed design would be undertaken at appropriate scales to visualise property impacts. Property acquisition would be managed in accordance with the provisions of the Land Acquisition Policy (RTA 2011) and the <i>Land Acquisition (Just Terms Compensation) Act 1991</i>. Impacts to the future intermodal site near Ashworth Drive as a result of the relocation of the creek line or piping would be minimised in consultation with property owner. 		
22	Socio-economic and land use impacts	<ul style="list-style-type: none"> RMS and contractors would work closely with businesses and residents affected by parking restrictions during construction to develop alternative measures to ensure access and trade can continue during construction. 	Contractor	During construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		<ul style="list-style-type: none"> • Use of temporary road signage would be considered in consultation with business owners where businesses may be impacted due to lack of views from the road during construction. • Property access would be maintained wherever possible. Prior to any unavoidable disruption to access, consultation would be undertaken with the affected property owner. • Local residents would be notified prior to works commencing and would be kept regularly informed of construction activities during the construction process and informed of changed conditions including likely disruptions to access. • A complaints-handling procedure and register would be included in the CEMP. • Residents would be informed prior to any interruptions to utility services that may be experienced as a result of utilities relocation. 		
23	Socio-economic and land use	<ul style="list-style-type: none"> • Future Mid-block pedestrian crossings would be monitored within one year of operation between Littlebourne Street and 	Project manager	Operation

No.	Impact	Environmental safeguards	Responsibility	Timing
	impacts	Pat O’Leary Drive. This would be conducted by RMS to determine whether these have increased, decreased or remained the same compared to existing conditions. Should it be determined that pedestrian safety is compromised.		
24	Aboriginal Heritage	<ul style="list-style-type: none"> • If Aboriginal heritage items are uncovered during the works, all works in the vicinity of the find must cease and the RMS’ Aboriginal cultural heritage advisor and the senior regional environmental officer contacted immediately. Works in the vicinity of the find must not re-commence until clearance has been received from those RMS officers and OEH/EPA. 	Contractor	During construction
25	Resource management and waste	<ul style="list-style-type: none"> • The contractor would classify any excavated spoil as per the <i>Protection of the Environment Operations Act 1997</i>. • Resource management hierarchy principles are to be followed: <ul style="list-style-type: none"> ○ avoid unnecessary resource consumption as a priority ○ avoidance is followed by resource recovery (including reuse of materials, reprocessing, and recycling and energy recovery) ○ disposal is undertaken as a last resort (in accordance with the <i>Waste Avoidance & Resource Recovery Act 2001</i>). • Excavated material would be reused on other RMS projects 	Contractor	During construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		<p>where possible.</p> <ul style="list-style-type: none"> • Other recyclable wastes would be separated and transported to a suitable recycler. • Construction waste material would not be left on-site once the works have been completed. • Working areas would be maintained, kept free of rubbish and cleaned up at the end of each working day. • Any offsite disposal of spoil would be accompanied by a section 143 permit under the <i>Protection of the Environment Operations Act 1997</i> if required. • The use of water would be minimised through water recycling and the use of reclaimed water in accordance with RTA Environmental Direction 19 – Use of Reclaimed Water • Procurement would endeavour to use materials and products with a recycled content and low carbon footprint where that material or product is cost and performance effective. • Roadside infrastructure e.g. signs would be reused or recycled where feasible. 		
26	Operational hazards and risks	<ul style="list-style-type: none"> • In addition to the safeguards listed in other sections, a road safety audit of the proposal would be undertaken during the 	Project manager	Pre-construction and during construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		detailed design and during the construction of the proposal.		
27	Climate change	<ul style="list-style-type: none"> • Detailed design, including drainage requirements, would take into consideration the effect of climate change on the proposal. • Further investigations into opportunities for reducing greenhouse emissions during construction and operation of the proposal would be undertaken during the detailed design phase. 	Project manager	Pre-construction
28	Climate change	<ul style="list-style-type: none"> • Appropriate sized construction equipment, plant and vehicles would be used. • Frequent servicing of equipment would be undertaken to ensure optimal performance and minimise down-time (which can reduce time disturbance and access areas). • Layout of the vehicles and buildings would be undertaken in a way to minimise movement and clearing. • Intelligent vehicle use, such as not leaving the engine idling when not in use, would be undertaken. • Investigation of alternative fuels and power sources to be used would be undertaken and implemented, where appropriate. • Energy efficiency and related carbon emissions of vehicle and plant equipment would be considered, where possible. 	Contractor	During construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		<ul style="list-style-type: none"> • Recycling of waste would be undertaken where possible. • Material and waste supply and departure scheduling would be undertaken to optimise full loads and minimise required vehicle trips. • Minimisation of clearing of natural vegetation in the road design process would be undertaken where feasible. 		
29	Climate change	<ul style="list-style-type: none"> • Regular inspections of pavement and structures along the road corridor would be undertaken and maintenance carried out as necessary. • Energy-efficient lighting would be used where appropriate. • Investigation of alternative power sources to be used where appropriate (e.g. solar power). 	Project manager	Operation
30	Cumulative impacts	<ul style="list-style-type: none"> • The proposed construction staging would take into account future proposed developments in Kelso to minimise potential adverse impacts during construction. 	Project manager and contractor	Pre-construction and construction

4.3 Licensing and approvals

Table 4.2: Summary of licensing and approval required.

Requirement	Timing
In accordance with section 199 of the <i>Fisheries Management Act 1994</i> , the RMS would have to give the Minister written notice and would have to consider any matters raised by the Minister in order to carry out any dredging or reclamation work.	The proposal would involve dredging and reclamation work and therefore notification would be given to the Minister, and any matters raised by the Minister would be considered within 28 days after the giving of the notice. This would be undertaken prior to any dredging and reclamation being undertaken.
Section 220 of this Act requires the Minister to issue a permit for blocking of fish passage.	A permit to temporarily block fish passage during the construction of culverts would be required should it be determined during detailed design that construction of culverts cannot be undertaken without impeding flows.
An Aboriginal Heritage Impact Permit (AHIP) under section 90 of the <i>National Parks and Wildlife Act 1974</i> would not be required.	No known Aboriginal heritage sites would be impacted on either completely or partially. If an Aboriginal heritage site (s) is found, and the site cannot be conserved, a section 90 consent would be required prior to any impact to these sites.
An excavation permit under section 139 of the <i>Heritage Act 1977</i> may be required during excavation if a heritage item or relic is found.	This would be required during excavation if a heritage item or relic is found, prior to undertaking any further excavation works in that area.

5 References

nghenvironmental 2011. NSW Roads and Maritime Services Great Western Highway upgrade at Kelso. Review of Environmental Factors.

RMS 2012. Roads and Maritime Services land acquisition information guide.